

REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-3, 5-8 and 13-18 are presently active in this case, Claims 1-3 and 5-8 amended, Claims 4 and 9-12 canceled and Claims 13-18 added by way of the present amendment.

In the outstanding Office Action, Claims 10 and 11 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,368,776 to Negita et al.; Claims 1, 4, 7-9 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Negita et al. in view of JP 05071893 to Sakai; Claims 2 and 3 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Negita et al. in view of U.S. Patent No. 6,306,226 to Inio et al.; and Claims 5 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Negita et al. and Sakai, and further in view of U.S. Patent Publication 2002/0084002 to Hardin et al.

With regard to the rejection of Claims 10-12, these claims have been canceled and, therefore, the rejection is moot.

Turning now to the merits, in order to expedite issuance of a patent in this case, Applicants have amended independent Claim 1 to clarify the patentable features of this claim over the cited references. Specifically, Applicants' Claim 1, as amended, recites a method for manufacturing an aluminum heat exchanger, the method including providing a heat exchanger tube by forming a Zn thermally sprayed layer on an outer surface of an aluminum flat tube core so as to provide a Zn adhesion amount of 2 to 6 g/m² covering 10 to 90% of a total area of the outer surface of the aluminum flat tube. Also recited is assembling a heat exchanger core by alternately arranging the heat exchanger tube and an aluminum fin and brazing the heat exchanger tube and the fin with end portions of the heat exchanger tube connected in fluid communication to respective aluminum headers. A corrosion resistance

coat is formed on a surface of the heat exchanger core by subjecting the surface of the heat exchanger core to chemical conversion treatment using at least one chemical conversion treatment agent selected from the group consisting of phosphoric acid chromate, chromic acid chromate, phosphoric acid zirconium series, phosphoric acid titanium series, fluoridation zirconium series, and fluoridation titanium series.

Thus, Claim 1 has been amended to recite that the Zn thermally sprayed layer is provided on an outer surface of the aluminum flat tube. Further, amended Claim 1 recites that the Zn adhesion amount is 2 to 6g/m² (previously recited in Claim 4) and the Zn thermally sprayed layer covers 10 to 90% of a total area of the outer surface of the aluminum flat tube (previously recited in Claim 9).

Negita et al. discloses a heat exchanger adapted for an automobile. As seen in Figure 2A of Negita et al., the disclosed heat exchanger includes a tube 1, a Zn diffusion layer 13 formed on an inner surface of the heat exchanger tube by plate processing, and a resin coating 14 formed on an inner surface of the Zn diffusion layer 13. The Zn diffusion layer 13 and resin coating 14 cover the entire inner surface of the tube 1. Further, as seen in Fig. 2B, a phosphoric acid-chromate film can optionally be provided interposed between the Zn diffusion layer 13 and resin coating 14.

Thus, Negita et al. discloses that the Zn has an adhesion amount of 1g/m², which is outside the range of 2 to 6g/m² now recited in amended Claim 1. The Office Action acknowledges this deficiency, but concludes that Negita et al. discloses the loading amount as a “result effective variable,” which would be obvious to optimize. Applicants agree that a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) See MPEP ' 2144.05 II B. However, each of the

multiple examples and comparative examples in Negita et al. hold the Zn adhesion amount as 1g/m^2 . That is, Negita et al. merely discloses the Zn adhesion amount as 1g/m^2 , without any indication that this is variable or what effect such variability may have on the heat exchanger. As discussed in Applicants' specification, the present inventors recognized that where the Zn adhesion amount is too small, the desired corrosion resistance is hard to achieve, but where the resistance is too high, the Zn can diffuse into a fillet between the tube and fin, which can cause corrosion and detachment.¹ Contrary to the position taken in the Office Action, Negita et al. simply does not disclose the Zn the adhesion amount as a result effective variable.

In addition, Negita et al. does not disclose that the Zn thermally sprayed layer covers 10 to 90% of a total area of the outer surface of the aluminum flat tube as also now recited in Claim 1. In this regard, the Office Action merely concludes that Negita et al. teaches this feature (previously recited in Claim 9) without providing any explanation of how this feature is taught in the cited reference. As noted above, Negita et al. discloses that the Zn layer 13 is provided to cover the inside surface of the tube 1. There is no indication in Negita et al. that the Zn layer is only partially provided on the surface of the tube. As discussed in Applicants' specification, it is the present inventors who recognized that a ratio of Zn coverage outside the claimed range may cause insufficient corrosion protection, or cause the Zn can diffuse into a fillet between the tube and fin, which can cause corrosion and detachment.²

Further, the Office Action acknowledges that Negita et al. does not disclose thermally spraying the Zn layer but cites the secondary reference to Sakai as correcting this deficiency, and concludes that it would be obvious to combine Negita et al. and Sakai. Applicants disagree with this conclusion. As noted above, amended Claim 1 recites that the Zn thermal spray layer is provided on an outer surface of the flat tube, and Negita et al. provides a Zn

¹ Applicants' published specification at paragraph 54.

² Applicants' published specification at paragraph 55.

plating layer on an inside of the exchanger tube. Applicants submit that one of ordinary skill in the art would not provide a thermal spray Zn coating of Sakai on an outer surface of the tube in Negita et al., which is already corrosion protected on an interior thereof. Further, it is impossible to substitute the Zn thermal spraying technique of Sakai with the plating technique of Negita et al., since the Zn layer cannot be formed on the inner surface of the heat exchanger tube by thermal spraying processing. Thus, it would not be obvious for one of ordinary skill in the art to combine the thermal spraying technique of Sakai with the heat exchanger of Negita et al.

Still further, Claim 1 recites a corrosion resistance coat formed by chemical conversion treatment. In contrast, Negita et al. discloses that the Zn coated tube is treated by chemical conversion treatment, and thereafter a resin coating film corrosion-resistant coating film is formed. As noted above, Claim 1 recites a chemical conversion treatment step for forming the corrosion resistance coat, not as a pretreatment of a resin coating as in Negita et al. Thus, the chemical conversion treatment of the present invention is completely different from that of Negita et al. in terms of structures and effects. This provides another distinction over Negita et al. and Sakai.

For the reasons discussed above, independent Claim 1, as amended, patentably defines over Negita et al. and Sakai. Further, Iino et al. and Hardin et al. are directed to processing agents of chemical etching treatment and chemical conversion treatment. Therefore, Iino et al. and Hardin et al. cannot correct the deficiencies of Negita et al. and Sakai. Therefore, independent Claim 1 patentably defines over the cited references. As Claims 2-3, 5-8 and 13-18 depend from Claim 1, these dependent claims also patentably define over the cited references.

Nevertheless, Applicants submit that the dependent claims provide further bases for patentability over the cited references. Specifically, Claims 6 and 14 recite preferred ranges

for the Zr adhesion amount in the chemical conversion treatment; Claims 7, 15 and 16 recite preferred mass % of Cu and Mn; and Claims 8 and 17 recite preferred mass % of Zn in the fin core. The Office Action takes official notice of many of these features. However, Applicants hereby traverse any such official notice. As discussed throughout Applicants' specification, the present inventors identified ranges for each of these parameters, which provide advantages for the disclosed heat exchanger. The prior art does not disclose these ranges. Further, as set forth in M.P.E.P. § 2144.03, if an applicant traverses an assertion made by an Examiner while taking official notice, the Examiner should cite a reference in support of their assertion.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application and the present application is believed to be in condition for formal allowance. An early and favorable action is therefore respectfully requested.

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